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BARR

February 2, 2012

Mr. Jason Gunter
Remedial Project Manager
U.S. Environmental Protection Agency
Region 7 - Superfund Branch
901 North 5th Street
Kansas City, KS 66101

Re: The Doe Run Company – Elvins/Rivermines Mine Tailings Site Monthly Progress Report

Dear Mr. Gunter:

As required by Article VI, Section 56 of the Unilateral Administrative Order (UAO) (CERCLA-07-2005-0169) for the referenced project and on behalf of The Doe Run Company, the progress report for the period December 1, 2011 through December 31, 2011 is enclosed. If you have any questions or comments, please call me at 573-638-5020 or Mark Nations at 573-518-0800.

Sincerely,

Ty L. Morris, P.E., R.G.
Vice President

TLM/jms
Enclosures
c: Mark Nations – TDRC
Matt Wohl – TDRC (electronic only)
Steve Batts – TDRC (electronic only)
Kathy Rangen – MDNR
Tim Skoglund – Barr Engineering

Elvins/Rivermines Mine Tailings Site
Park Hills, Missouri
Removal Action - Monthly Progress Report
Period: December 1, 2011 – December 31, 2011

1. **Actions Performed and Problems Encountered This Period:**

   a. Previously a theory was developed that iron oxide precipitation was the cause of clogging in the zero valent iron / sand (ZVI/sand) filter. On December 2, 2011, insulation board was installed on the water surface in the ZVI/sand filter as a short-term solution to prevent diffusion of oxygen into the water, and therefore reduce aerobic oxidization of the iron. On December 14, 2011, as a test for a long-term, full-scale solution to oxygen diffusion, an organic media blanket was installed on the surface of the iron/sand media.

   Clogging of the ZVI/sand filter occurred at a faster rate after installation of the organic media blanket. After investigation, it was hypothesized that the organic media blanket increased sulfate reduction within the square tank, which in turn increased carbonate precipitation. To remedy this, the organic media was removed on December 27, 2011, and replaced with a layer of pea gravel, which extends above the outlet of the iron/sand filter. To keep air from diffusing into the water permeating through the pea gravel, a permeable geotextile fabric was placed on top of the pea gravel, and weighed down with a thin layer of crushed limestone. The effectiveness of this setup has proved to be ineffective, as a loss in permeability of the ZVI/sand filter was recorded in early January 2012.

   b. The flow rate into the organic roughing filter (pool) remained at about 6 gallons per minute from December 2, 2011 to December 20, 2011, at which point it was turned down to about 2 gallons per minute until removal of the organic media blanket on December 27, 2011 when it was returned to a rate of 6 gallons per minute. Due to clogging in the ZVI/sand filter, the flow rate through the ZVI/sand filter varied between 0.5 gallons per minute and about 6 gallons per minute.

   c. Water backing up in the aeration (round) tank occurred in the month of December. The water surface elevation in the round tank eventually rose above the influent pipe in the round tank, causing the whole system to back up and the pool to overflow. It is suspected that iron oxide precipitation in the voids between the limestone in the round tank lowered the permeability of the media within the tank, thus causing an increase in water level. It is suspected a similar problem occurred near the outlet of the round tank. To remedy this, some of the limestone was removed, and the effluent pipe was converted to a standpipe to allow solids to settle below the inlet of the effluent pipe.

   d. Analytical sampling and field measurements continued one to three times a week for the duration of the month of December.

2. **Analytical Data and Results Received This Period:**

   a. The removal percentage for dissolved zinc in the effluent was found to range between 95.9% and 99.0% between December 2, 2011 and December 27, 2011. This equated to dissolved zinc levels that ranged between 184 µg/L and 802 µg/L.

   b. The removal percentage for total zinc in the effluent was found to range between 92.4% and 96.0% between December 2, 2011 and December 27, 2011. This equated to total zinc levels that ranged between 524 µg/L and 1.45 mg/L.

   c. Iron concentrations in the system effluent between December 2, 2011 and December 27, 2011 ranged from 2.1 mg/L to 35.0 mg/L.

   d. Total suspended solids concentrations in the system effluent between December 2, 2011 and December 27, 2011 ranged from 12 mg/L to 1620 mg/L.

e. Chronic WET testing was performed using samples pulled from the system effluent on November 28, 2011, November 30, 2011, and December 2, 2011. The NOEC was 25% for survival and 12.5% for reproduction; the LOEC was 50% for survival and 25% for reproduction.

f. During this period, water samples were collected from just upstream of Old Missouri Highway 32, as well as from upstream and downstream of the confluence of the site discharge with Flat River. The analytical results for this event are included in this progress report.

g. During this period, the Ambient Air Monitoring Report for third quarter 2011 and October 2011 were received. Any issues identified in these reports are discussed below. A copy of these documents has been sent to your attention.

The third quarter 2011 Ambient Air Monitoring Report noted the following:

- The action levels for lead and dust were not exceeded.
- No samples were taken with the TSP monitors on 7/4/11 due to the holiday.
- No sample was taken on the Rivermines #1 (Office) TSP monitor due to a power outage.
- No samples were taken with the TSP monitors on 7/18/11 and 7/19/11 due to the entire crew being in training.
- No samples were taken with the TSP monitors on 9/5/11 due to the holiday.

The October 2011 Ambient Air Monitoring Report noted the following:

- The action levels for lead and dust were not exceeded.
- No samples were taken with the TSP monitors on 10/20/11 due to training.

3. Developments Anticipated and Work Scheduled for Next Period:

a. Continue analytical samples and field measurements three times a week.

b. Perform Chronic WET testing on the system effluent to gauge the system's effluent toxicity. This is scheduled for late January, but may be postponed until early February.

c. Perform any maintenance or adjustments to the pilot test system that may be needed.

d. Install a layer of organic media on top of the ZVI/sand filter to reduce the exposure of the water in the filter to the atmosphere and limit the contact of the iron in the ZVI/sand filter with dissolved oxygen.

e. Complete monthly water sampling activities as described in the Removal Action Work Plan.

f. Complete air monitoring activities as described in the Removal Action Work Plan.

4. Changes in Personnel:

a. None.

5. Issues or Problems Arising This Period:

a. None.

6. Resolution of Issues or Problems Arising This Period:

a. None.

End of Monthly Progress Report

December 28, 2011

Allison Olds
Barr Engineering Company
1001 Diamond Ridge
Suite 1100
Jefferson City, MO 65109
TEL: (573) 638-5007
FAX: (573) 638-5001

RE: Rivermines MS-25/86-0009 **WorkOrder:** 11120950

Dear Allison Olds:

TEKLAB, INC received 4 samples on 12/21/2011 10:00:00 AM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Michael L. Austin
Project Manager
(618)344-1004 ex 16
MAustin@teklabinc.com

Client: Barr Engineering Company
Client Project: Rivermines MS-25/86-0009

Work Order: 11120950
Report Date: 28-Dec-11

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
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Laboratory Results	5
Sample Summary	9
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Quality Control Results	12
Receiving Check List	17
Chain of Custody	Appended

Client: Barr Engineering Company
Work Order: 11120950
Client Project: Rivermines MS-25/86-0009
Report Date: 28-Dec-11

Abbr Definition

CCV	Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
DF	Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilutions factors.
DNI	Did not ignite
DUP	Laboratory duplicate is an aliquot of a sample taken from the same container under laboratory conditions for independent processing and analysis independently of the original aliquot.
ICV	Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
IDPH	IL Dept. of Public Health
LCS	Laboratory control sample, spiked with verified known amounts of analytes, is analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. The acceptable recovery range is in the QC Package (provided upon request).
LCSD	Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MB	Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
MDL	Method detection limit means the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte.
MS	Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
MSD	Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
MW	Molecular weight
ND	Not Detected at the Reporting Limit
NELAP	NELAP Accredited
PQL	Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions. The acceptable recovery range is listed in the QC Package (provided upon request).
RL	The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
RPD	Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
SPK	The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
Surr	Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
TNTC	Too numerous to count (> 200 CFU)

Qualifiers

- # - Unknown hydrocarbon
- B - Analyte detected in associated Method Blank
- E - Value above quantitation range
- H - Holding times exceeded
- M - Manual Integration used to determine area response
- ND - Not Detected at the Reporting Limit
- R - RPD outside accepted recovery limits
- S - Spike Recovery outside recovery limits
- X - Value exceeds Maximum Contaminant Level

Client: Barr Engineering Company
Client Project: Rivermines MS-25/86-0009

Work Order: 11120950
Report Date: 28-Dec-11

Cooler Receipt Temp: 2.8 °C

Locations and Accreditations

Collinsville		Springfield		Kansas City	
Address	5445 Horseshoe Lake Road Collinsville, IL 62234-7425	Address	3920 Pintail Dr Springfield, IL 62711-9415	Address	8421 Nieman Road Lenexa, KS 66214
Phone	(618) 344-1004	Phone	(217) 698-1004	Phone	(913) 541-1998
Fax	(618) 344-1005	Fax	(217) 698-1005	Fax	(913) 541-1998
Email	jhriley@teklabinc.com	Email	kmcclain@teklabinc.com	Email	dthompson@teklabinc.com

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2012	Collinsville
Kansas	KDHE	E-10374	NELAP	1/31/2012	Collinsville
Louisiana	LDEQ	166493	NELAP	6/30/2012	Collinsville
Louisiana	LDEQ	166578	NELAP	6/30/2012	Springfield
Arkansas	ADEQ	88-0966		3/14/2012	Collinsville
Illinois	IDPH	17584		4/30/2012	Collinsville
Kentucky	UST	0073		5/26/2012	Collinsville
Missouri	MDNR	00930		4/13/2013	Collinsville
Oklahoma	ODEQ	9978		8/31/2012	Collinsville

Client: Barr Engineering Company
Work Order: 11120950
Client Project: Rivermines MS-25/86-0009
Report Date: 28-Dec-11
Lab ID: 11120950-001
Client Sample ID: RM-001
Matrix: AQUEOUS
Collection Date: 12/20/2011 10:20

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 600 375.2 REV 2.0 1993 (TOTAL)								
Sulfate	NELAP	375		**776**	mg/L	5	12/22/2011 15:08	R158102
STANDARD METHOD 18TH ED. 4500-H B, LABORATORY ANALYZED								
Lab pH	NELAP	1.00		**7.69**		1	12/21/2011 16:29	R158038
STANDARD METHODS 18TH ED. 2340 C								
Hardness, as (CaCO3)	NELAP	5		**920**	mg/L	1	12/22/2011 6:45	R158019
STANDARD METHODS 18TH ED. 2540 D								
Total Suspended Solids	NELAP	6		**< 6**	mg/L	1	12/21/2011 13:28	R158073
STANDARD METHODS 18TH ED. 2540 F								
Solids, Settleable	NELAP	0.1		**< 0.1**	ml/L	1	12/21/2011 13:05	R158035
STANDARD METHODS 18TH ED. 5310 C, ORGANIC CARBON								
Total Organic Carbon (TOC)	NELAP	1.0		**3.8**	mg/L	1	12/23/2011 8:07	R158167
EPA 600 4.1.1, 200.7R4.4, METALS BY ICP (DISSOLVED)								
Cadmium	NELAP	2.00		**12.3**	µg/L	1	12/22/2011 16:53	73820
Zinc	NELAP	10.0		**12200**	µg/L	1	12/22/2011 16:53	73820
EPA 600 4.1.4, 200.7R4.4, METALS BY ICP (TOTAL)								
Cadmium	NELAP	2.00		**12.7**	µg/L	1	12/22/2011 20:46	73829
Zinc	NELAP	10.0		**12500**	µg/L	1	12/22/2011 20:46	73829
STANDARD METHODS 18TH ED. 3030 B, 3113 B, METALS BY GFAA (DISSOLVED)								
Lead	NELAP	2.00	X	**12.2**	µg/L	1	12/23/2011 8:38	73810
STANDARD METHODS 18TH ED. 3030 E, 3113 B, METALS BY GFAA								
Lead	NELAP	4.00	SX	**14.2**	µg/L	2	12/23/2011 12:55	73807

Pb - Matrix interference present in sample. Verified by bench spike.

Client: Barr Engineering Company
Work Order: 11120950
Client Project: Rivermines MS-25/86-0009
Report Date: 28-Dec-11
Lab ID: 11120950-002
Client Sample ID: RM-Dup
Matrix: AQUEOUS
Collection Date: 12/20/2011 10:30

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 600 375.2 REV 2.0 1993 (TOTAL)								
Sulfate	NELAP	375		**763**	mg/L	5	12/22/2011 15:16	R158102
STANDARD METHOD 18TH ED. 4500-H B, LABORATORY ANALYZED								
Lab pH	NELAP	1.00		**7.67**		1	12/21/2011 16:32	R158038
STANDARD METHODS 18TH ED. 2340 C								
Hardness, as (CaCO3)	NELAP	5		**940**	mg/L	1	12/22/2011 6:45	R158019
STANDARD METHODS 18TH ED. 2540 D								
Total Suspended Solids	NELAP	6		**< 6**	mg/L	1	12/21/2011 13:29	R158073
STANDARD METHODS 18TH ED. 2540 F								
Solids, Settleable	NELAP	0.1		**< 0.1**	ml/L	1	12/21/2011 13:05	R158035
STANDARD METHODS 18TH ED. 5310 C, ORGANIC CARBON								
Total Organic Carbon (TOC)	NELAP	1.0		**2.9**	mg/L	1	12/23/2011 8:07	R158167
EPA 600 4.1.1, 200.7R4.4, METALS BY ICP (DISSOLVED)								
Cadmium	NELAP	2.00		**12.3**	µg/L	1	12/22/2011 16:59	73820
Zinc	NELAP	10.0	S	**12100**	µg/L	1	12/22/2011 16:59	73820
Zn - Sample concentration was greater than 5 times the spike concentration.								
EPA 600 4.1.4, 200.7R4.4, METALS BY ICP (TOTAL)								
Cadmium	NELAP	2.00		**13.2**	µg/L	1	12/22/2011 20:51	73829
Zinc	NELAP	10.0	S	**12800**	µg/L	1	12/22/2011 20:51	73829
Zn - Sample concentration was greater than 5 times the spike concentration.								
STANDARD METHODS 18TH ED. 3030 B, 3113 B, METALS BY GFAA (DISSOLVED)								
Lead	NELAP	2.00	X	**10.9**	µg/L	1	12/22/2011 15:35	73810
STANDARD METHODS 18TH ED. 3030 E, 3113 B, METALS BY GFAA								
Lead	NELAP	2.00	X	**13.6**	µg/L	1	12/23/2011 11:33	73807

Client: Barr Engineering Company
Work Order: 11120950
Client Project: Rivermines MS-25/86-0009
Report Date: 28-Dec-11
Lab ID: 11120950-003
Client Sample ID: RM-DS
Matrix: AQUEOUS
Collection Date: 12/20/2011 12:25

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 600 375.2 REV 2.0 1993 (TOTAL)								
Sulfate	NELAP	40		**53**	mg/L	4	12/23/2011 15:11	R158144
STANDARD METHOD 18TH ED. 4500-H B, LABORATORY ANALYZED								
Lab pH	NELAP	1.00		**7.90**		1	12/21/2011 16:59	R158038
STANDARD METHODS 18TH ED. 2340 C								
Hardness, as (CaCO3)	NELAP	5		**280**	mg/L	1	12/22/2011 6:45	R158019
STANDARD METHODS 18TH ED. 2540 D								
Total Suspended Solids	NELAP	6		**< 6**	mg/L	1	12/21/2011 13:29	R158073
STANDARD METHODS 18TH ED. 5310 C, ORGANIC CARBON								
Total Organic Carbon (TOC)	NELAP	1.0		**4.6**	mg/L	1	12/23/2011 8:07	R158167
EPA 600 4.1.1, 200.7R4.4, METALS BY ICP (DISSOLVED)								
Cadmium	NELAP	2.00		**< 2.00**	µg/L	1	12/22/2011 17:16	73820
Zinc	NELAP	10.0		**262**	µg/L	1	12/22/2011 17:16	73820
EPA 600 4.1.4, 200.7R4.4, METALS BY ICP (TOTAL)								
Cadmium	NELAP	2.00		**< 2.00**	µg/L	1	12/22/2011 21:21	73829
Zinc	NELAP	10.0		**298**	µg/L	1	12/22/2011 21:21	73829
STANDARD METHODS 18TH ED. 3030 B, 3113 B, METALS BY GFAA (DISSOLVED)								
Lead	NELAP	2.00		**< 2.00**	µg/L	1	12/22/2011 15:38	73810
STANDARD METHODS 18TH ED. 3030 E, 3113 B, METALS BY GFAA								
Lead	NELAP	2.00		**3.64**	µg/L	1	12/23/2011 11:36	73807

Client: Barr Engineering Company
Work Order: 11120950
Client Project: Rivermines MS-25/86-0009
Report Date: 28-Dec-11
Lab ID: 11120950-004
Client Sample ID: RM-US
Matrix: AQUEOUS
Collection Date: 12/20/2011 10:05

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
EPA 600 375.2 REV 2.0 1993 (TOTAL)								
Sulfate	NELAP	10		**35**	mg/L	1	12/23/2011 15:14	R158144
STANDARD METHOD 18TH ED. 4500-H B, LABORATORY ANALYZED								
Lab pH	NELAP	1.00		**7.89**		1	12/21/2011 17:02	R158038
STANDARD METHODS 18TH ED. 2340 C								
Hardness, as (CaCO3)	NELAP	5		**240**	mg/L	1	12/22/2011 6:45	R158019
STANDARD METHODS 18TH ED. 2540 D								
Total Suspended Solids	NELAP	6		**< 6**	mg/L	1	12/21/2011 13:29	R158073
STANDARD METHODS 18TH ED. 5310 C, ORGANIC CARBON								
Total Organic Carbon (TOC)	NELAP	1.0		**4.7**	mg/L	1	12/23/2011 8:07	R158167
EPA 600 4.1.1, 200.7R4.4, METALS BY ICP (DISSOLVED)								
Cadmium	NELAP	2.00		**< 2.00**	µg/L	1	12/22/2011 17:22	73820
Zinc	NELAP	10.0		**< 10.0**	µg/L	1	12/22/2011 17:22	73820
EPA 600 4.1.4, 200.7R4.4, METALS BY ICP (TOTAL)								
Cadmium	NELAP	2.00		**< 2.00**	µg/L	1	12/22/2011 21:26	73829
Zinc	NELAP	10.0		**< 10.0**	µg/L	1	12/22/2011 21:26	73829
STANDARD METHODS 18TH ED. 3030 B, 3113 B, METALS BY GFAA (DISSOLVED)								
Lead	NELAP	2.00		**< 2.00**	µg/L	1	12/22/2011 15:41	73810
STANDARD METHODS 18TH ED. 3030 E, 3113 B, METALS BY GFAA								
Lead	NELAP	2.00		**< 2.00**	µg/L	1	12/23/2011 11:40	73807

Client: Barr Engineering Company
Client Project: Rivermines MS-25/86-0009

Work Order: 11120950
Report Date: 28-Dec-11

Lab Sample ID	Client Sample ID	Matrix	Fractions	Collection Date
11120950-001	RM-001	Aqueous	5	12/20/2011 10:20
11120950-002	RM-Dup	Aqueous	5	12/20/2011 10:30
11120950-003	RM-DS	Aqueous	5	12/20/2011 12:25
11120950-004	RM-US	Aqueous	5	12/20/2011 10:05

Client: Barr Engineering Company
Client Project: Rivermines MS-25/86-0009

Work Order: 11120950
Report Date: 28-Dec-11

Sample ID	Client Sample ID / Test Name	Collection Date	Received Date / Prep Date/Time	Analysis Date/Time
11120950-001A	RM-001	12/20/2011 10:20	12/21/2011 10:00:00 AM	
	Standard Methods 18th Ed. 2540 F			12/21/2011 13:05
11120950-001B	RM-001	12/20/2011 10:20	12/21/2011 10:00:00 AM	
	EPA 600 375.2 Rev 2.0 1993 (Total)			12/22/2011 15:08
	Standard Method 18th Ed. 4500-H B, Laboratory Analyzed			12/21/2011 16:29
	Standard Methods 18th Ed. 2340 C			12/22/2011 6:45
	Standard Methods 18th Ed. 2540 D			12/21/2011 13:28
11120950-001C	RM-001	12/20/2011 10:20	12/21/2011 10:00:00 AM	
	EPA 600 4.1.4, 200.7R4.4, Metals by ICP (Total)		12/22/2011 9:16	12/22/2011 20:46
	Standard Methods 18th Ed. 3030 E, 3113 B, Metals by GFAA		12/21/2011 14:53	12/23/2011 12:55
11120950-001D	RM-001	12/20/2011 10:20	12/21/2011 10:00:00 AM	
	EPA 600 4.1.1, 200.7R4.4, Metals by ICP (Dissolved)		12/22/2011 7:52	12/22/2011 16:53
	Standard Methods 18th Ed. 3030 B, 3113 B, Metals by GFAA (Dissolved)		12/21/2011 15:53	12/23/2011 8:38
11120950-001E	RM-001	12/20/2011 10:20	12/21/2011 10:00:00 AM	
	Standard Methods 18th Ed. 5310 C, Organic Carbon			12/23/2011 8:07
11120950-002A	RM-Dup	12/20/2011 10:30	12/21/2011 10:00:00 AM	
	Standard Methods 18th Ed. 2540 F			12/21/2011 13:05
11120950-002B	RM-Dup	12/20/2011 10:30	12/21/2011 10:00:00 AM	
	EPA 600 375.2 Rev 2.0 1993 (Total)			12/22/2011 15:16
	Standard Method 18th Ed. 4500-H B, Laboratory Analyzed			12/21/2011 16:32
	Standard Methods 18th Ed. 2340 C			12/22/2011 6:45
	Standard Methods 18th Ed. 2540 D			12/21/2011 13:29
11120950-002C	RM-Dup	12/20/2011 10:30	12/21/2011 10:00:00 AM	
	EPA 600 4.1.4, 200.7R4.4, Metals by ICP (Total)		12/22/2011 9:16	12/22/2011 20:51
	Standard Methods 18th Ed. 3030 E, 3113 B, Metals by GFAA		12/21/2011 14:53	12/23/2011 11:33
11120950-002D	RM-Dup	12/20/2011 10:30	12/21/2011 10:00:00 AM	
	EPA 600 4.1.1, 200.7R4.4, Metals by ICP (Dissolved)		12/22/2011 7:52	12/22/2011 16:59
	Standard Methods 18th Ed. 3030 B, 3113 B, Metals by GFAA (Dissolved)		12/21/2011 15:53	12/22/2011 15:35
11120950-002E	RM-Dup	12/20/2011 10:30	12/21/2011 10:00:00 AM	
	Standard Methods 18th Ed. 5310 C, Organic Carbon			12/23/2011 8:07
11120950-003A	RM-DS	12/20/2011 12:25	12/21/2011 10:00:00 AM	
	Standard Method 18th Ed. 4500-H B, Laboratory Analyzed			12/21/2011 16:59
	Standard Methods 18th Ed. 2540 D			12/21/2011 13:29
11120950-003B	RM-DS	12/20/2011 12:25	12/21/2011 10:00:00 AM	
	EPA 600 375.2 Rev 2.0 1993 (Total)			12/23/2011 15:11
	Standard Methods 18th Ed. 2340 C			12/22/2011 6:45

Client: Barr Engineering Company
Client Project: Rivermines MS-25/86-0009

Work Order: 11120950
Report Date: 28-Dec-11

Sample ID	Client Sample ID / Test Name	Collection Date	Received Date / Prep Date/Time	Analysis Date/Time
11120950-003C	RM-DS	12/20/2011 12:25	12/21/2011 10:00:00 AM	
	EPA 600 4.1.4, 200.7R4.4, Metals by ICP (Total)		12/22/2011 9:16	12/22/2011 21:21
	Standard Methods 18th Ed. 3030 E, 3113 B, Metals by GFAA		12/21/2011 14:53	12/23/2011 11:36
11120950-003D	RM-DS	12/20/2011 12:25	12/21/2011 10:00:00 AM	
	EPA 600 4.1.1, 200.7R4.4, Metals by ICP (Dissolved)		12/22/2011 7:52	12/22/2011 17:16
	Standard Methods 18th Ed. 3030 B, 3113 B, Metals by GFAA (Dissolved)		12/21/2011 15:53	12/22/2011 15:38
11120950-003E	RM-DS	12/20/2011 12:25	12/21/2011 10:00:00 AM	
	Standard Methods 18th Ed. 5310 C, Organic Carbon			12/23/2011 8:07
11120950-004A	RM-US	12/20/2011 10:05	12/21/2011 10:00:00 AM	
	Standard Method 18th Ed. 4500-H B, Laboratory Analyzed			12/21/2011 17:02
	Standard Methods 18th Ed. 2540 D			12/21/2011 13:29
11120950-004B	RM-US	12/20/2011 10:05	12/21/2011 10:00:00 AM	
	EPA 600 375.2 Rev 2.0 1993 (Total)			12/23/2011 15:14
	Standard Methods 18th Ed. 2340 C			12/22/2011 6:45
11120950-004C	RM-US	12/20/2011 10:05	12/21/2011 10:00:00 AM	
	EPA 600 4.1.4, 200.7R4.4, Metals by ICP (Total)		12/22/2011 9:16	12/22/2011 21:26
	Standard Methods 18th Ed. 3030 E, 3113 B, Metals by GFAA		12/21/2011 14:53	12/23/2011 11:40
11120950-004D	RM-US	12/20/2011 10:05	12/21/2011 10:00:00 AM	
	EPA 600 4.1.1, 200.7R4.4, Metals by ICP (Dissolved)		12/22/2011 7:52	12/22/2011 17:22
	Standard Methods 18th Ed. 3030 B, 3113 B, Metals by GFAA (Dissolved)		12/21/2011 15:53	12/22/2011 15:41
11120950-004E	RM-US	12/20/2011 10:05	12/21/2011 10:00:00 AM	
	Standard Methods 18th Ed. 5310 C, Organic Carbon			12/23/2011 8:07

Client: Barr Engineering Company
Client Project: Rivermines MS-25/86-0009

Work Order: 11120950
Report Date: 28-Dec-11

EPA 600 375.2 REV 2.0 1993 (TOTAL)

Batch R158102 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	75		**< 75**						12/22/2011

Batch R158102 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	75		**146**	150	0	97.5	90	110	12/22/2011

Batch R158144 **SampType:** MBLK Units **mg/L**
SampID: ICB/MBLK

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		**< 10**						12/23/2011

Batch R158144 **SampType:** LCS Units **mg/L**
SampID: ICV/LCS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		**20**	20	0	97.8	90	110	12/23/2011

STANDARD METHOD 18TH ED. 4500-H B, LABORATORY ANALYZED

Batch R158038 **SampType:** LCS Units
SampID: LCS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Lab pH	1.00		**7.02**	7.00	0	100.3	99.1	100.8	12/21/2011

Batch R158038 **SampType:** DUP Units RPD Limit **10**
SampID: 11120950-001BDUP

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Lab pH	1.00		**7.69**				7.690	0.00	12/21/2011

Batch R158038 **SampType:** DUP Units RPD Limit **10**
SampID: 11120950-002BDUP

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Lab pH	1.00		**7.68**				7.670	0.13	12/21/2011

Batch R158038 **SampType:** DUP Units RPD Limit **10**
SampID: 11120950-003ADUP

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Lab pH	1.00		**7.91**				7.900	0.13	12/21/2011

Client: Barr Engineering Company
Client Project: Rivermines MS-25/86-0009

Work Order: 11120950
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STANDARD METHOD 18TH ED. 4500-H B, LABORATORY ANALYZED

Batch R158038 **SampType:** DUP Units RPD Limit 10
SampID: 11120950-004ADUP

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Lab pH	1.00		7.89				7.890	0.00	12/21/2011

STANDARD METHODS 18TH ED. 2340 C

Batch R158019 **SampType:** MBLK Units mg/L
SampID: MB-R158019

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hardness, as (CaCO3)	5		< 5						12/21/2011

Batch R158019 **SampType:** LCS Units mg/L
SampID: LCS-R158019

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hardness, as (CaCO3)	5		1000	1000	0	100.0	90	110	12/21/2011

Batch R158019 **SampType:** MS Units mg/L
SampID: 11120950-003BMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Hardness, as (CaCO3)	5		680	400	280.0	100.0	85	115	12/22/2011

Batch R158019 **SampType:** MSD Units mg/L RPD Limit 10
SampID: 11120950-003BMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Hardness, as (CaCO3)	5		680	400	280.0	100.0	680.0	0.00	12/22/2011

STANDARD METHODS 18TH ED. 2540 D

Batch R158073 **SampType:** MBLK Units mg/L
SampID: MBLK

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Suspended Solids	6		< 6						12/21/2011

Batch R158073 **SampType:** LCS Units mg/L
SampID: LCS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Suspended Solids	6		91	100	0	91.0	85	115	12/21/2011
Total Suspended Solids	6		101	100	0	101.0	85	115	12/21/2011
Total Suspended Solids	6		100	100	0	100.0	85	115	12/21/2011

Batch R158073 **SampType:** DUP Units mg/L RPD Limit 15
SampID: 11120950-001B DUP

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Suspended Solids	6		< 6				0	0.00	12/21/2011

Client: Barr Engineering Company
Work Order: 11120950
Client Project: Rivermines MS-25/86-0009
Report Date: 28-Dec-11

STANDARD METHODS 18TH ED. 5310 C, ORGANIC CARBON

Batch R158167 **SampType:** MBLK Units mg/L
SampID: MB-R158167

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)	1.0		< 1.0						12/23/2011

Batch R158167 **SampType:** LCS Units mg/L
SampID: LCS-R158167

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)	5.0		50.8	48.2	0	105.4	89.6	109.5	12/23/2011

Batch R158167 **SampType:** MS Units mg/L
SampID: 11120950-001EMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Total Organic Carbon (TOC)	1.0		8.4	5.0	3.800	92.0	80	120	12/23/2011

Batch R158167 **SampType:** MSD Units mg/L RPD Limit 15
SampID: 11120950-001EMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Total Organic Carbon (TOC)	1.0		8.9	5.0	3.800	101.4	8.400	5.44	12/23/2011

EPA 600 4.1.1, 200.7R4.4, METALS BY ICP (DISSOLVED)

Batch 73820 **SampType:** MBLK Units µg/L
SampID: MB-73820

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cadmium	2.00		< 2.00	2.00	0	0	-100	100	12/22/2011
Zinc	10.0		< 10.0	10.0	0	0	-100	100	12/22/2011

Batch 73820 **SampType:** LCS Units µg/L
SampID: LCS-73820

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cadmium	2.00		48.5	50.0	0	97.0	85	115	12/22/2011
Zinc	10.0		506	500	0	101.2	85	115	12/22/2011

Batch 73820 **SampType:** MS Units µg/L
SampID: 11120950-002DMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cadmium	2.00		58.6	50.0	12.3	92.6	75	125	12/22/2011
Zinc	10.0		12500	500	12130	76.0	75	125	12/22/2011

Batch 73820 **SampType:** MSD Units µg/L RPD Limit 20
SampID: 11120950-002DMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cadmium	2.00		58.0	50.0	12.3	91.4	58.6	1.03	12/22/2011
Zinc	10.0	S	12500	500	12130	74.0	12510	0.08	12/22/2011

Client: Barr Engineering Company
Client Project: Rivermines MS-25/86-0009

Work Order: 11120950
Report Date: 28-Dec-11

EPA 600 4.1.4, 200.7R4.4, METALS BY ICP (TOTAL)

Batch 73829 **SampType:** MBLK Units µg/L
SampID: MB-73829

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cadmium	2.00		**< 2.00**	2.00	0	0	-100	100	12/22/2011
Zinc	10.0		**< 10.0**	10.0	0	21.0	-100	100	12/22/2011

Batch 73829 **SampType:** LCS Units µg/L
SampID: LCS-73829

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cadmium	2.00		**51.9**	50.0	0	103.8	85	115	12/22/2011
Zinc	10.0		**541**	500	0	108.2	85	115	12/22/2011

Batch 73829 **SampType:** MS Units µg/L
SampID: 11120950-002CMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Cadmium	2.00		**62.9**	50.0	13.2	99.4	75	125	12/22/2011
Zinc	10.0		**13400**	500	12760	120.0	75	125	12/22/2011

Batch 73829 **SampType:** MSD Units µg/L RPD Limit **20**
SampID: 11120950-002CMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Cadmium	2.00		**60.5**	50.0	13.2	94.6	62.9	3.89	12/22/2011
Zinc	10.0	S	**12900**	500	12760	24.0	13360	3.66	12/22/2011

STANDARD METHODS 18TH ED. 3030 B, 3113 B, METALS BY GFAA (DISSOLVED)

Batch 73810 **SampType:** MBLK Units µg/L
SampID: MB-73810

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Lead	2.00		**< 2.00**	2.00	0	0	-100	100	12/22/2011

Batch 73810 **SampType:** LCS Units µg/L
SampID: LCS-73810

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Lead	2.00		**13.9**	15.0	0	92.4	80	120	12/22/2011

Batch 73810 **SampType:** MS Units µg/L
SampID: 11120950-001DMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Lead	2.00		**23.8**	15.0	12.1885	77.1	70	130	12/23/2011

Batch 73810 **SampType:** MSD Units µg/L RPD Limit **20**
SampID: 11120950-001DMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Lead	2.00		**25.4**	15.0	12.1885	87.8	23.753	6.54	12/23/2011

Client: Barr Engineering Company
Client Project: Rivermines MS-25/86-0009

Work Order: 11120950
Report Date: 28-Dec-11

STANDARD METHODS 18TH ED. 3030 E, 3113 B, METALS BY GFAA

Batch 73807 **SampType:** MBLK Units µg/L
SampID: MB-73807

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Lead	2.00		**< 2.00**	2.00	0	0	-100	100	12/23/2011

Batch 73807 **SampType:** LCS Units µg/L
SampID: LCS-73807

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Lead	2.00		**13.3**	15.0	0	88.8	80	120	12/23/2011

Batch 73807 **SampType:** MS Units µg/L
SampID: 11120950-001CMS

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Lead	4.00		**26.2**	15.0	14.1854	80.0	70	130	12/23/2011

Batch 73807 **SampType:** MSD Units µg/L RPD Limit **20**
SampID: 11120950-001CMSD

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Lead	4.00	S	**24.2**	15.0	14.1854	66.6	26.1884	8.02	12/23/2011

Teklab, Inc.
Environmental Laboratory

Receiving Check List

http://www.teklabinc.com/

Client: Barr Engineering Company
Client Project: Rivermines MS-25/86-0009

Work Order: 11120950
Report Date: 28-Dec-11

Carrier: Ricky Schmidt

Received By: TWM

Completed by: Timothy W. Mathis
On: 21-Dec-11

Reviewed by: Heather A. White
On: 21-Dec-11

Pages to follow: Chain of custody [1] Extra pages included [0]

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C	2.8		
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice	☐		
Chain of custody present?	Yes ☑	No ☐					
Chain of custody signed when relinquished and received?	Yes ☑	No ☐					
Chain of custody agrees with sample labels?	Yes ☑	No ☐					
Samples in proper container/bottle?	Yes ☑	No ☐					
Sample containers intact?	Yes ☑	No ☐					
Sufficient sample volume for indicated test?	Yes ☑	No ☐					
All samples received within holding time?	Yes ☑	No ☐					
Reported field parameters measured:	Field ☐	Lab ☑	NA ☐				
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐					
When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.							
Water – at least one vial per sample has zero headspace?	Yes ☐	No ☐	No VOA vials ☑				
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers ☑				
Water - pH acceptable upon receipt?	Yes ☑	No ☐					

Any No responses must be detailed below or on the COC.

Custody seal(s) intact on shipping container/cooler.

Teklab Chain of Custody

Pg. 1 of 1 Workorder 11120960

5445 Horseshoe Lake Road ~ Collinsville, IL 62234 ~ Phone: (618)344-1004 ~ Fax:(618)344-1005

Barr Engineering Co.

1001 Diamond Ridge, Suite 1100

Jefferson City | MO | 65109

Rivermines MS - 25/86-0009

Are the samples chilled? (•) Yes ( ) No with: (•) Ice ( ) Blue Ice Preserved in (•) Lab ( ) Field

Cooler Temp 2.8 Sampler Chris Schulte

Teklab, Inc. Courier Pick Up 12/21/11

Comments: Invoice to Mark Nations. Results to Allison Olds and Mark Nations, mnations@doerun.com
Matrix is surface water. RS 12/21/11 Custody Seal intact upon pickup
Metals = Cd, Pb, Zn

Contact Allison Olds eMail aolds@barr.com Phone 573-638-5007 Requested Due Date Standard Billing/PO Per contract with Doe Run

Lab Use	Sample ID	Sample Date/Time	Preservative	Matrix	pH	T.S.S.	Sulfate	Settleable Solids	T.O.C.	Total Metals	Dissolved Metals	Hardness				
11120960 001	RM-001	12/20/11 10:20	Unpres 5	Aqueous	X	X	X	X	X	X	X	X				
002	RM-Dup	10:30	Unpres 5	Aqueous	X	X	X	X	X	X	X	X				
003	RM-DS	12:25	Unpres 5	Aqueous	X	X	X		X	X	X	X				
004	RM-US	10:05	Unpres 5	Aqueous	X	X	X		X	X	X	X				
			Unpres	Aqueous												
			Unpres	Aqueous												
			Unpres	Aqueous												
			Unpres	Aqueous												

Relinquished By *	Date/Time	Received By	Date/Time
Chris Schulte / Barr	12/20/11 / 16:00	[signature]	12/21/11 8:45
[signature]	12/21/11 10:00	[signature]	12-21-11 1000

* The individual signing this agreement on behalf of client acknowledges that they have read and understand the terms of this agreement and that they have the authority to sign on behalf of client.